

**What is claimed is:**

- Sab M*
1. A method of manufacturing an antenna capable of being mounted on a printed circuit board, comprising:
- 5       selecting the design dimensions of a unitary piece of material according to an operating wavelength;
- stamp out the unitary piece of material from a larger section of material according to the design dimensions to form an antenna, the unitary piece comprising:
- 10      a circular area having a center and an outer region; and
- 15      a stem area having a first end and a second end, the first end joined with the outer region, the unitary piece bendable at the first end and the outer region.
2. The method of claim 1 further comprising:
- determining the operating wavelength from an operating frequency.
3. The method of claim 1 further comprising:
- bending the unitary piece at the first end and the outer region so that the circular area is perpendicular to the stem area.
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4. The method of claim 1 wherein the design dimensions comprise:
- a radius defined from the center to a point on the outer region along a radial axis.
5. The method of claim 4 wherein the radius is approximately equal to one twelfth of the
- 20      operating wavelength.
6. The method of claim 4 wherein the radius is approximately equal to one thirteenth of the operating wavelength.

7. The method of claim 4 wherein the stem area protrudes outward from the outer region along the radial axis.
8. The method of claim 1 wherein the design dimensions comprise:  
a radius defined from the center to a point on the outer region along a radial axis; and  
5 a stem length defined from the first end to the second end.
9. The method of claim 8 wherein the stem length is approximately equal to the radius.
10. The method of claim 8 wherein the stem length is approximately equal to one twelfth of the operating wavelength.
11. The method of claim 8 wherein the stem length is approximately equal to one tenth of the operating wavelength.
12. The method of claim 1 wherein the stem area is not tapered between the first end and the second end so that a first width at the first end of the stem area is equivalent to a second width at the second end of the stem area.
13. The method of claim 1 wherein the stem area exhibits a step change in width between the first end and the second end so that a first width at the first end of the stem area exceeds a second width at the second end of the stem area.
15. The method of claim 1 wherein the stem area is gradually tapered between the first end and the second end so that a first width at the first end of the stem area exceeds a second width at the second end of the stem area.
14. The method of claim 1 wherein the larger section of material is planar.
- 20 15. The method of claim 1 wherein the unitary piece of material is planar prior to bending of the unitary piece.

17. The method of claim 1 further comprising:  
bending the unitary piece into a shape capable of operating as an antenna.
18. The method of claim 1 wherein the unitary piece of material comprises a continuous  
piece of flat metal.
- 5 19. A method of manufacturing an antenna capable of being mounted on a printed circuit  
board, comprising:  
selecting the design dimensions of a unitary piece of material according to an operating  
wavelength;  
stamping out the unitary piece of material from a larger section of material according to  
the design dimensions to form an antenna, the unitary piece comprising:  
a circular area having a center and an outer region; and  
a stem area having a first end and a second end, the first end joined with the outer  
region, the unitary piece bendable at the first end and the outer region.  
a foot area having a third end and a fourth end, the third end joined with the  
second end, the unitary piece bendable at the third end and the second end.
20. The method of claim 19 further comprising:  
bending the unitary piece so that the circular area is perpendicular to the stem area, and  
so that the stem area is perpendicular to the foot area.
21. The method of claim 19 further comprising:  
20 bending the unitary piece at the first end and the outer region so that the circular area is  
perpendicular to the stem area.
22. The method of claim 19 further comprising:

bending the unitary piece at the third end and the second end so that the stem area is perpendicular to the foot area.

23. The method of claim 19 wherein the design dimensions comprise:  
a radius defined from the center to a point on the outer region along a radial axis;  
5 a stem length defined from the first end to the second end; and  
a foot length defined from the third end to the fourth end.
24. The method of claim 19 wherein a first width at the second end of the stem area is equivalent to a second width at the third end of the stem area.
25. The method of claim 24 wherein the stem area is not tapered between the first end and the second end so that a third width at the first end of the stem area is equivalent to the first width at the second end of the stem area.
26. The method of claim 24 wherein the stem area is gradually tapered between the first end and the second end so that a third width at the first end of the stem area exceeds the first width at the second end of the stem area.
27. A method of manufacturing an antenna capable of being mounted on a printed circuit board, comprising:  
selecting the design dimensions of a unitary piece of material according to an operating wavelength;  
stamping out the unitary piece of material from a larger section of material according to  
20 the design dimensions to form an antenna, the unitary piece comprising:  
a circular area having a center and an outer region; and

a stem area having a first end and a second end, the first end joined with the outer region, the unitary piece bendable at the first end and the outer region.

a root area having a third end and a fourth end, the third end joined with the second end, the second end having a first width and the third end having a second width, the first width exceeding the second width.

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28. The method of claim 27 further comprising:  
bending the unitary piece at the first end and the outer region so that the circular area is  
perpendicular to the stem area.
29. The method of claim 27 wherein the design dimensions comprise:  
a radius defined from the center to a point on the outer region along a radial axis;  
a stem length defined from the first end to the second end; and  
a root length defined from the third end to the fourth end.
30. The method of claim 27 wherein the stem area is not tapered between the first end and  
the second end so that a third width at the first end of the stem area is equivalent to the first  
width at the second end of the stem area.
31. The method of claim 27 wherein the stem area is gradually tapered between the first end  
and the second end so that a third width at the first end of the stem area exceeds the first width at  
the second end of the stem area.